

been bestowed upon the eruptive rocks which form so important and interesting a feature of Colorado geology. The more characteristic varieties are represented by distinct shades of crimson or orange, and they have been mapped in such a way as to convey at a glance, and even without the aid of sections, a tolerably clear notion of the volcanic phenomena of the region. On the one hand we see the great lava-sheets capping the mesas and spreading far over the plateaux, on the other we notice the great centres of volcanic activity, with their abundant flows, dykes, and breccias.

Two sheets of sections, drawn across all the more interesting and important portions of the geology, complete the vast fund of information given by the maps; while, that nothing may be wanting to enable readers to realise what has been done by the Survey, and the conditions under which it has been accomplished, two large sheets of sketches are given, which most vividly represent the forms of the mountains, plateaux, mesas, and river-channels, as seen from various commanding heights.

Dr. Hayden, with whose personal supervision this great work has been accomplished, has increased tenfold the obligations under which he has laid geologists all over the world for the number and value of his contributions to geology. He now furnishes us with new light whereby to read his former researches and those of his able colleagues. May we venture to hope that he may find leisure to confer yet one further benefit before the progress of his Survey plunges him into a new whirl of work? If he could be prevailed upon to sketch out a plan for digesting the materials of his published Annual Reports, he could doubtless find among his staff some competent writer who, under his guidance, could produce a well-arranged systematic guide-book or text-book to complete the value of the work of his Survey. Such a book of reference as would give a reader who has never had access to the Annual Reports a clear and comprehensive view of Colorado geology, would be of very great service.

These remarks may be fitly closed with an expression of the warmest admiration of the liberal spirit in which the United States Government has conducted these Surveys of the Territories and has published their results. This costly atlas has been distributed gratuitously all over Europe. That this is a wise policy cannot be doubted. Whether actuated or not by a desire to diffuse scientific information, the authorities at Washington do well to make as widely known as possible the geological structure and economic resources of their country. They cast their bread upon the waters, and the harvest comes to them in the form of eager, active emigrants from all parts of Europe.

ARCH. GEIKIE

OUR BOOK SHELF

Forest Flora of British Burma. By S. Kurz, Curator of the Herbarium, Royal Botanical Gardens, Calcutta. (Calcutta: Office of the Superintendent of Government Printing, 1877.)

By the completion of the work whose title is given above, we have the third valuable contribution to a knowledge of the rich vegetation of our Indian forests. In all three works, namely, Col. Beddoe's "Flora Sylvatica of Southern India," Brandis's and Stewart's "Forest

Flora of North-West and Central India," and the book now before us, there is much in common, and the plans of the two latter are very similar. There is, however, one great difference between Beddoe's and Brandis's Floras and the present issue; while the first two are most profusely illustrated, the work under consideration is entirely without plates. This, perhaps, is not to be regretted considering that the work in its present form constitutes two good-sized volumes; and further than this, Indian plants have of late been very well represented, notably in the two forest floras just referred to. Another distinction, and perhaps one more affecting foresters generally, for whose benefit these floras are ostensibly prepared, is the meagre information regarding the uses of the plants mentioned. Mr. Kurz excuses himself for reducing this portion of his work to a minimum, and refers to Brandis's "Forest Flora" for information on this head. We regret that Mr. Kurz did not see his way to greater condensation in his descriptions, and, if need be, the use of smaller type, so as to reduce the bulk of the book. At the same time its efficiency would have been much increased had he followed Dr. Brandis in giving extended notes as to the uses, for to no similar work can we point with so much satisfaction in this respect as to that of Dr. Brandis.

Regarding the nomenclature of genera and species, it is a pity that some kind of uniformity should not prevail amongst the different authors. Many forest officers would, to say the least, be somewhat confused as to the use of a proper name when he finds in two books published by authority and appearing within a year or two of each other a different generic distinction for the same plant; thus Brandis keeps up the rubiaceous genus *Adina*, and figures *A. cordifolia* of Hook. fil. and Benth., placing *Nauclea cordifolia*, Roxb., as a synonym. Kurz, on the contrary, retains *Nauclea* as a genus, sinking under it *Adina cordifolia*, which is spelt *Andina*, and attributed to Roxb. On this subject of nomenclature, however, Mr. Kurz says: "I confess myself an admirer of, and adherent to, the botanical laws as laid down by the International Botanical Congress at Paris in the year 1867, and published by Prof. Alph. de Candolle. These are translated into nearly all modern languages, and are now generally adopted in Europe, except at Kew. However, I have deviated in several cases in favour of Hooker's 'Indian Flora,' or kept up old-established names, not because I assent to such irregularities, but simply because I thought it not fair that I, a German, should introduce my individual convictions into a practical work written solely for the use of English people."

Notwithstanding the remarks which we have been obliged to make, Mr. Kurz's Flora is one of very great value, and, taken in conjunction with those we have before referred to, forms a pretty complete forest flora of British India. We are reminded by the passing of this work through our hands of the loss Indian botany has sustained by the lamented death of its author.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

American Storm Warnings

THE author of the papers on the American Storm Warnings (NATURE, vol. xviii. pp. 4, 31, 61) seems well acquainted with the storms and storm-warnings of America, and at least with some of the results arrived at in Europe, and if he had confined himself to what he really knew, and to the description of the means

which are used by the *Herald* Office (with which Mr. Collins seems to be connected) to issue storm-warnings from the United States to Europe, no objection could be made against him. But Mr. Collins is more ambitious, and makes some assertions which run against the most authenticated facts known to meteorology, and others which may be true, but ought yet to be proved, while Mr. Collins, without any proof whatever, seems to consider them quite well established.

I must first object to the absence of distinction between the seasons, which is so important a feature in storms, especially in lower latitudes. Mr. Collins seems not to know that the West India hurricanes and other destructive tropical storms are frequent only at certain seasons. This is quite enough to dispose of the author's assertion "that the conditions which combine to develop nearly all areas of low pressure are of equatorial origin." The most violent storms of Europe and the United States happen in the colder months of the year, when there are no storms in the tropical belt north of the equator (very few exceptions are known); besides the use of the word "equatorial" must be objected to as, so far as I know, no cyclone has ever originated between 5° N.L. and 5° S.L., at least,¹ so that we may call the storms of the West Indies, the South Indian Ocean, about the Mascarenes, of the Bay of Bengal, &c., *tropical storms*—because they certainly originate in the tropical belt—but certainly not equatorial. So far as Europe is concerned, there are some few cases in which West India hurricanes have reached it, but this is confined to the months of July to October. At the same time of the year it is not impossible that cyclones originating in the tropical belt of the Pacific may strike the Pacific coast of the United States. As to the storms mentioned by Mr. Collins, which strike the west coast of Mexico, pass over the plateau, and thence into Southern Texas, I very much doubt their existence. In any case no storm of this kind has ever been followed on this route, and so Mr. Collins ought to be rather careful in speaking of them. So far as I know, from books published about Mexico, and from personal information, no storms are experienced on the Mexican plateau.

The same absolute want of facts and general improbability can be urged against the storms which Mr. Collins takes from the Asiatic continent to the Pacific and thence to the American continent. Here the distinction of the seasons is especially necessary, as all Eastern Asia is under the influence of monsoons or periodical winds.² In winter, when pressure is so enormously high in the interior of Eastern Siberia,³ and the winds are north-west and north on the coast, that is, bring the cold dry air of the interior towards the Pacific Ocean, these conditions are favourable neither to local depressions nor to the propagation of European storms, which generally die out in Eastern Russia or Western Siberia. In summer the pressure is low in the interior of Asia, and air is constantly drawn from the Pacific Ocean to supply the deficiency towards the end of the rainy season or summer monsoon—in August to October is the time of the typhoons, that is, of the cyclones of the China Seas; but they do not originate on the Asiatic continent, and only strike it on a very limited area, that is, the coast of Southern China. These typhoons may perhaps reach California, as the West India hurricanes reach Europe, but it is not yet proved that this has ever been the case.

I admit that in autumn, that is, September and October, storms may perhaps pass from the Asiatic continent to the Pacific, and thence to America; but in latitudes far to the north of those visited by the typhoons. At Yakutsk, in North-East Siberia, the prevailing winds of that season are west and south-west, the amount of cloud great, and rains frequent, if not abundant, while the temperature is generally above freezing-point to the middle of October. I consider it possible that Atlantic (European) storms may, at this season, travel over the whole of Northern Siberia and reach the Pacific. In winter this is impossible, on account of the low temperature and high pressure then existing in Siberia.

I resume a few facts either well authenticated or very probable about storm-centres (cyclones) of the northern hemisphere.

1. By far the most of them originate in the middle latitudes (35°-65° N.) in Europe, North America, the Atlantic, and

¹ It would be too long to state why there are no equatorial cyclones. I would advise Mr. Collins to consult "*Etudes sur les Mouvements de l'Atmosphère*," by Guldberg and Mohn.

² See "Winds of the Globe," by Coffin.—Smithsonian Contrib. vol. xx.

³ See Petermann's *Mittheilungen*, July, 1878, p. 259, and the short notice in NATURE, vol. xviii. p. 288.

Pacific. As to the three first-named regions it is abundantly proved by the observations we have already. As to the Pacific, we want the direct proof, because observations are too few. But nobody will doubt that, in conditions of climate so analogous to those of the Atlantic cyclones do also originate.

2. Cyclones are of much rarer occurrence in Asia, except the great summer depression, which is of a different nature, and remains the whole summer over the driest parts of the continent.

3. Tropical cyclones are confined to a few months of the year, and even these seldom reach the latitudes north of 35° N.

Lastly, a few words about Mr. Bennett's storm-warnings. I do not doubt that some storms may reach Europe from America. But it is not at all certain that every storm that has passed from the eastern coast of America should reach Europe. This is the first difficulty in storm-warnings from America. The other is, that neither the path the storm will take nor its rate of progress can be known with certainty. Every one who has examined European and American synoptical maps will have noticed how different the paths of the centres are. So long as the storm can be followed on land, by means of numerous stations, a great approximation to certainty in predicting it is possible, as the durations are caused by certain pre-existing states of pressure, temperature, humidity, &c. But how is this to be done on the ocean?

Meteorologists of great ability, especially Prof. Buys Ballot, have often advocated telegraph lines to the Azores and Iceland, so that these islands might serve as advanced guards to predict storms in Europe. At such a distance as they are from our continent they certainly could serve this purpose, as is clearly shown by the French *Atlas Météorologique* and Hoffmeyer's synoptical maps. As to American predictions for Europe, I must confess that most European meteorologists are very doubtful about it. It is to be noticed also that, as storms are very frequent in western Europe, and as the rate of progress of storm-centres over the Atlantic is not accurately known, there may be a seeming success in American predictions which the facts, when accurately known, would not justify.

This is not meant to cast a shade on the spirit of enterprise of Mr. Bennett in organising the *Herald* weather predictions. The observations thus collected, or saved from oblivion, will certainly be useful, even if it be proved that storm-warnings from America are not reliable.

A. WOEIKOF

St. Petersburg

A White Grouse

WHEN shooting, yesterday, on the moors near Dunrobin, I fired at an ordinary grouse and killed it; just as it fell, another bird rose that seemed to be a ptarmigan, from the complete whiteness of its plumage; a third bird then rose, and was shot. The three were picked up not far from each other, and were all very fine birds. It seemed strange that a ptarmigan should be so low; we were not very high above the sea, and far below the elevation affected by these birds. On examining it, it proved to be a very fine grouse, snowy white, with a few dark feathers in the tail and wings. It was not an albino; I think the eyes were dark. It is a very beautiful bird, has been sent off to Inverness to be stuffed, and will be preserved in the Dunrobin Museum.

No one here had seen a specimen of the white grouse before, and it excited considerable interest. No doubt it is only an accident, and its progeny, if it had any, would have been the ordinary grouse.

It may be less rare than I suppose, but you may deem its occurrence worthy notice in NATURE.

J. FAYRER

Dunrobin Castle, Sutherland, September 8

Brehm's "Thierleben"

IN last week's NATURE you have copied a drawing, "cobra charming," from Brehm's "Thierleben," presumably for its excellence. Permit me, however, to point out a most serious defect in its truthfulness—the relative proportions of the snakes to the charmers.

Take the youth blowing the horn to be 4 feet 6 inches in height (he could not be much less), the hoods of the cobras must be 8 to 9 inches across. Now I will venture to say that a hood of 4½ inches across has never yet been measured, in a live specimen at least.

I cannot now lay my hands on a cobra skin I have, and give